

WHAT IS CLAIMED IS:

1. A variable length stent deployment apparatus for use in a body vessel comprising:

a flexible catheter body having a proximal end and a distal end adapted for positioning in the vessel;

stenting structure releasably held by the catheter body in an unexpanded configuration, the stenting structure being movable from the unexpanded configuration to an expanded configuration adapted to engage a wall of the vessel; and

a deployment mechanism coupled to the catheter body adapted to deploy a deployable portion of the stenting structure having a selectable length, wherein the deployable portion is released into the vessel in the expanded configuration while a remaining portion of the stenting structure remains releasably held by the catheter body in the unexpanded configuration.

2. The variable length stent deployment apparatus of claim 1 wherein the stenting structure comprises a plurality of stent segments, the deployment mechanism being adapted to select one or more of the stent segments for inclusion in the deployable portion.

3. The variable length stent deployment apparatus of claim 2 wherein the deployment mechanism is adapted to deploy a plurality of stent segments simultaneously.

4. The variable length stent deployment apparatus of claim 2 further comprising a constraining element for constraining expansion of a selected stent segment.

5. The variable length stent deployment apparatus of claim 4 wherein the constraining element is a sheath disposed over the selected stent segment.

6. The variable length stent deployment apparatus of claim 1 wherein the deployment mechanism comprises an expandable member on the catheter body, the deployable portion of the stenting structure being positionable over the expandable member for expansion thereby.

7. The variable length stent deployment apparatus of claim 6 wherein the length of the expandable member can be modified according to the length of the deployable portion.

8. The variable length stent deployment apparatus of claim 7 wherein the length of the expandable member can be modified by a sheath slidably disposed over the expandable member for constraining expansion of a selected portion of the expandable member.

9. The variable length stent deployment apparatus of claim 6 wherein the stenting structure is movable relative to the expandable member, further comprising a stent positioner for moving a selected portion of the stenting structure relative to the expandable member.

10. The variable length stent deployment apparatus of claim 1 further comprising a valve member on the catheter body adapted to separate the deployable portion from the remaining portion.

11. The variable length stent deployment apparatus of claim 1 wherein the stenting structure has a leading end closest to the distal end of the catheter body, and the deployable portion of the stenting structure extends proximally a selectable length from the leading end thereof.

12. The variable length stent deployment apparatus of claim 1 wherein the stenting structure is continuous throughout the length thereof, and the deployment mechanism is adapted to separate the deployable portion of the stenting structure from a remaining portion of the stenting structure at a selectable location.

13. The variable length stent deployment apparatus of claim 12 wherein the deployment mechanism is adapted to sever the stenting structure at the selectable location.

14. The variable length stent deployment apparatus of claim 12 wherein the deployment mechanism is adapted to deploy the stenting structure to the desired length distally from the distal end of the catheter body.

15. The variable length stent deployment apparatus of claim 13 wherein the stenting structure is severed by the deployment mechanism following deployment from the catheter body.

16. The variable length stent deployment apparatus of claim 12 wherein the stenting structure is a coil.

17. The variable length stent deployment apparatus of claim 12 wherein the stenting structure is a mesh.

18. The variable length stent deployment apparatus of claim 12 wherein the stenting structure is self-expanding.

19. The variable length stent deployment apparatus of claim 12 wherein the stenting structure is everted within the catheter body.

20. A method of deploying a stent of selectable length in a vessel, the method comprising:

endovascularly positioning a catheter in the vessel, the catheter having a distal end and stenting structure releasably disposed therein;

positioning a deployable portion of the stenting structure in a position suitable for deployment from the catheter;

determining a desired stent length;

adjusting the length of the deployable portion to be the desired stent length;

releasing the deployable portion from the catheter into the vessel, wherein the deployable portion expands to engage a wall of the vessel while a remaining portion of the stenting structure remains releasably disposed in the catheter.

21. The method of claim 20 wherein adjusting the length of the deployable portion comprises positioning a first portion of the stenting structure shorter than the desired stent length in a position in the catheter for deployment, and positioning an additional portion of the stenting structure in the catheter adjacent to the first portion for deployment therewith.

22. The method of claim 20 wherein adjusting the length of the deployable portion comprises axially moving the deployable portion relative to the remaining portion.

23. The method of claim 20 further comprising:

determining a second stent length different than the desired stent length;

selecting a second portion of the stenting structure having the second stent length; and

releasing the second portion in the vessel, wherein the second portion expands to engage a wall of the vessel.

24. The method of claim 20 wherein releasing the deployable portion comprises expanding an expandable member, further comprising adjusting the length of the expandable member according to the desired stent length.

25. The method of claim 20 wherein the stenting structure comprises a plurality of stent segments and adjusting the length of the deployable portion comprises repositioning a first stent segment relative to a second stent segment.

26. The method of claim 25 wherein the stent segments are connected by separable couplings.

27. The method of claim 25 wherein the stent segments are unconnected to each other.

28. The method of claim 25 wherein adjusting the length of the deployable portion comprises constraining expansion of a selected stent segment.

29. The method of claim 26 wherein the selected stent segment is constrained by a sheath disposed over the selected stent segment.

30. The method of claim 20 wherein releasing the deployable portion comprises expanding a balloon coupled to the catheter, the deployable portion being expanded by the balloon.

31. The method of claim 30 further comprising constraining expansion of a selected portion of the balloon.

32. The method of claim 30 wherein the stenting structure is movable relative to the balloon, further comprising moving a portion of the stenting structure relative to the balloon.

33. The method of claim 20 wherein adjusting the length of the deployable portion comprises using a valve member on the catheter to separate the deployable portion from a remaining portion of the stenting structure.

34. The method of claim 33 wherein a sheath is slidably disposed over the stenting structure, the valve member being disposed at a distal end of the sheath.

35. The method of claim 23 wherein the deployable portion and the second portion are deployed from a fixed position relative to the distal end of the catheter.

36. The method of claim 20 wherein the stenting structure has a leading end closest to the distal end of the catheter, and wherein adjusting the length of the deployable portion comprises selecting a desired length of the stenting structure extending proximally from the leading end thereof.

37. The method of claim 20 wherein the stenting structure is continuously connected through the length thereof, and adjusting the length of the deployable portion comprises separating the deployable portion of the stenting structure from a remaining portion of the stenting structure at a selectable location on the stenting structure.

38. The method of claim 37 wherein adjusting the length of the deployable portion comprises severing the stenting structure at the selectable location.

39. The method of claim 20 wherein adjusting the length of the deployable portion comprises advancing the desired length of the stent structure distally of the catheter.

40. The method of claim 37 wherein the deployable portion is separated following deployment by the deployment mechanism.

41. The method of claim 37 wherein the stenting structure is a coil.

42. The method of claim 37 wherein the stenting structure is a mesh.

43. The method of claim 37 wherein the stenting structure is everted within the catheter body.

44. The method of claim 20 wherein the stenting structure is self-expanding.

45. A method of deploying a stent of selectable length in a vessel, the method comprising:

endovascularly positioning a catheter in the vessel, the catheter having a distal end and stenting structure releasably coupled thereto, the stenting structure having a leading end closest to the distal end of the catheter;

determining a desired stent length;

selecting a deployable portion of the stenting structure, the deployable portion extending from the leading end proximally the desired stent length; and

releasing the deployable portion from the catheter into the vessel, wherein the deployable portion expands to engage a wall of the vessel while a remaining portion of the stenting structure remains coupled to the catheter.

46. A method of deploying a stent of selectable length in a vessel, the method comprising:

endovascularly positioning a catheter in the vessel, the catheter having a distal end and stenting structure releasably disposed near the distal end;

determining a first desired stent length;

selecting a deployable portion of the stenting structure having the first desired stent length;

axially separating the deployable portion from a remaining portion of the stenting structure;

releasing the deployable portion from the catheter into the vessel, wherein the deployable portion expands to engage a wall of the vessel while the remaining portion remains releasably disposed in the catheter;

determining a second desired stent length different than the first desired stent length;

selecting a second portion of the stenting structure having the second stent length; and

releasing the second portion in the vessel, wherein the second portion expands to engage a wall of the vessel.

47. A method of deploying a stent of selectable length in a vessel, the method comprising:

endovascularly positioning a catheter in the vessel, the catheter having a distal end, an expandable member near the distal end, and stenting structure disposed near the distal end, the expandable member having a length;

determining a desired stent length;  
selecting a deployable portion of the stenting structure having the desired stent length;  
positioning the deployable portion on the expandable member;  
adjusting the length of the expandable member according to the desired stent length; and  
expanding the expandable member wherein the deployable portion expands to engage a wall of the vessel while a remaining portion of the stenting structure remains disposed in the catheter.

48. A method of deploying a stent of selectable length in a vessel, the method comprising:  
endovascularly positioning a catheter in the vessel, the catheter having a distal end, a deployment mechanism, and stenting structure disposed near the distal end;  
positioning a deployable portion of the stenting structure in a position on the catheter suitable for deployment by the deployment mechanism;  
determining a desired stent length;  
adjusting the length of the deployable portion according to the desired stent length; and  
actuating the deployment mechanism to deploy the deployable portion, wherein the deployable portion expands to engage a wall of the vessel while a remaining portion of the stenting structure remains disposed in the catheter.

49. A method of deploying a stent of selectable length in a vessel, the method comprising:  
endovascularly positioning a catheter in the vessel, the catheter having a distal end;  
deploying from the catheter a first stent having a first length; and  
deploying from the catheter a second stent having a second length different than the first length;  
wherein the first and second stents are deployed from the same location relative to the distal end of the catheter.